

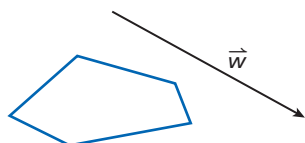
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## 9.2 Assignment: Translations

1. Is the shape a translation? Explain why or why not. (Example 1)



2. Draw the translation of the figure along the given vector. (Example 2)



3. Translate A (1, 3), B (-1, 2), C (2, 1), D (4, 2) along  $\langle -3, 3 \rangle$ . (Example 3)

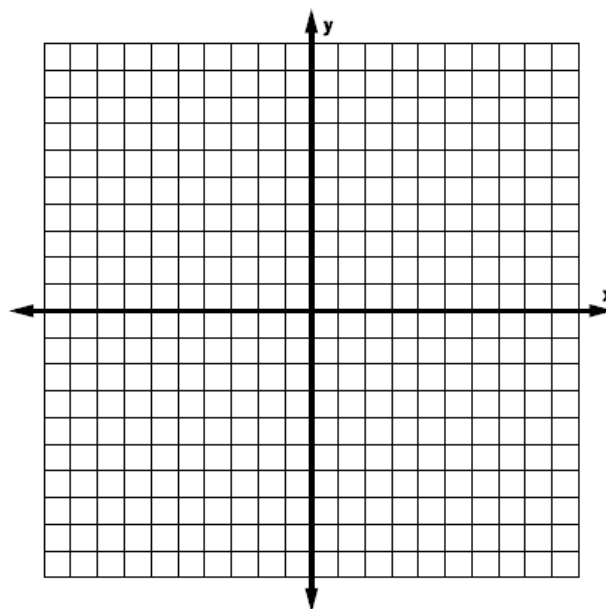
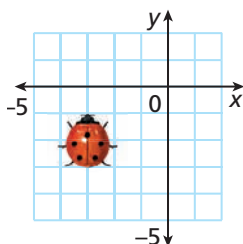
4. **Animation.** An animator draws the ladybug shown and then translates it along the vector  $\langle 1, 1 \rangle$ , followed by a translation of the new image along the vector  $\langle 2, 2 \rangle$ , followed by a

translation of the second image along the vector  $\langle 3, 3 \rangle$ .

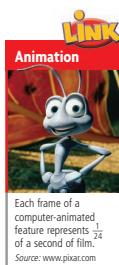
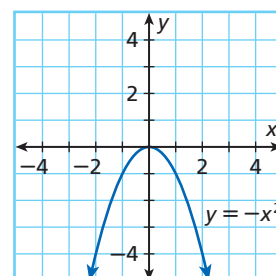
(Example 4)

a. Sketch the ladybug's final position.

b. What single vector moves the ladybug from its starting position to its final position?



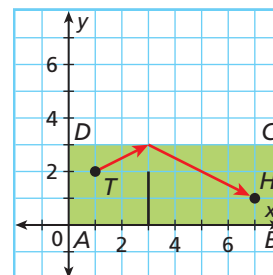
4. Draw the graph of the function with a translation  $\langle -1, 1 \rangle$ .



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**5. The figure shows one hole of a miniature golf course and the path of a ball from the tee T to the hole H.**



a) What translation vector represents the path of the ball from T to  $\overline{DC}$ ?

b) What translation vector represents the path of the ball from  $\overline{DC}$  to H?

c) Show that the sum of these vectors is equal to the vector that represents the straight path from T to H.

**6. Critical Thinking.** The points of a plane are translated along the given vector  $\overline{AB}$ . Do any points remain fixed under this transformation? That is, are there any points for which the image coincides with the preimage? Explain.



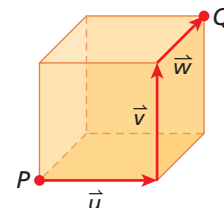
**7. Write About It.** Point P is translated along the vector  $\langle a, b \rangle$ . Explain how to find the distance between point P and its image.



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8. The point M (1, 2) is translated along a vector that is parallel to the line  $y = 2x + 4$ . The translation vector has magnitude  $\sqrt{5}$ . What are the possible images of point M?

9. A cube has edges of length 2 cm. Point P is translated along  $\vec{u}$ ,  $\vec{v}$ , &  $\vec{w}$  as shown.



a) Describe a single translation vector that maps point P to point Q.

b) Find the magnitude of this vector to the nearest hundredth.

10. **Probability.** The point P (3, 2) is translated along one of the following four vectors chosen at random:  $\langle -3, 0 \rangle$ ,  $\langle -1, -4 \rangle$ ,  $\langle 3, -2 \rangle$ , and  $\langle 2, 3 \rangle$ . Find the probability of each of the following.

a. The image of P is in the fourth quadrant.

b. The image of P is on an axis.

c. The image of P is at the origin.



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A vector in the form  $\langle a, b \rangle$  is called a **component vector**. Vectors can also be written as **polar vectors** in the form  $\langle r, d^\circ \rangle$  where  $r$  is the magnitude of the vector and  $d$  is the measure of the angle the vector makes with the positive  $x$ -axis. Angles are measured from  $0^\circ$  to  $360^\circ$  in a counterclockwise direction. Rewrite each component vector as a polar vector. Round to the nearest tenth if necessary.

11.  $\langle -6, -1 \rangle$

12.  $\langle 0, -2 \rangle$

Find the  $x$ - and  $y$ -coordinates of each given point after a translation along the given polar vector. Round to the nearest tenth if necessary.

13.  $(-3, -11)$ ;  $\langle 8, 90^\circ \rangle$

14.  $(4, 0)$ ;  $\langle 2.5, 230^\circ \rangle$

15. A translation has the effect of moving every point the same distance in the same direction. The notation  $T_{(h,k)}(a,b)$  means *the image of  $(a, b)$  under a translation of  $h$  units in the  $x$  direction and  $k$  units in the  $y$  direction*. Find the image of  $T_{(-1,-5)}(6,2)$ .